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AD-A032 539

ANALYSIS OF AIRCRAFT MAINTENANCE FACILITY ASSIGNMENTS AT WRIGHT-PATTERSON AIR FORCE BASE, OHIO

AIR FORCE INSTITUTE OF TECHNOLOGY,
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

SEPTEMBER 1976

ANALYSIS OF AIRCRAFT MAINTENANCE FACILITY ASSIGNMENTS AT WRIGHT-PATTERSON AFB, OHIO

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SLSR 17-76B

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER SLSR 17-76B	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) ANALYSIS OF AIRCRAFT MAINTENANCE FACILITY ASSIGNMENTS AT WRIGHT-PATTERSON AFB, OHIO		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Thomas M. Griffith, Captain, USAF Herbert A. Stewart, Captain, USAF		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Graduate Education Division School of Systems and Logistics Air Force Institute of Technology, WPAFB OH		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Department of Research and Communicative Studies (SLGR) AFIT/SLGR, WPAFB OH 45433		12. REPORT DATE September 1976 13. NUMBER OF PAGES 104
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for Public Release; Distribution Unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES APPROVED FOR PUBLIC RELEASE AFR 190-17. JERRAL F. GUESS, CAPT, USAF Director of Information		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Facilities; Facility Utilization; Aircraft Maintenance; Planning; Evaluation.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Thesis Chairman: Charles E. Ebeling, Captain, USAF		

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This research investigates the operational effectiveness of the facility assignments of the 4950th Test Wing Aircraft Maintenance Complex located at Wright-Patterson AFB, Ohio, by analyzing the total distance traveled by the personnel of the Complex over a period of time. The frequency and distance of the interactions between activities in a given set of fixed facilities, and alternative activity locations were evaluated. The objective of the investigation was to determine if the activity-facility assignments could be varied to decrease the total distance traveled between the activities. The analysis uses a heuristic variation of the steepest-descent pairwise-interchange solution procedure for quadratic assignment problems and evaluated the activity assignments. The results of the investigation show that the location of the functional activities of the 4950th Test Wing Aircraft Maintenance Complex can be changed to decrease the total distance involved in their interaction.

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Organization Location

SLSR 17-76B

ANALYSIS OF AIRCRAFT MAINTENANCE FACILITY ASSIGNMENTS AT WRIGHT-PATTERSON AFB, OHIO

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

and Master of Science in Facilities Management

By

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September 1976

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This thesis, written by

Captain Thomas M. Griffith

and

Captain Herbert A. Stewart

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN FACILITIES MANAGEMENT
(Captain Thomas M. Griffith)

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT
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DATE: 7 September 1976

Charles E. Ebeling
COMMITTEE CHAIRMAN

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CHAPTER 1

INTRODUCTION

STATEMENT OF THE PROBLEM

> Air Force installations must be evaluated continually for adequacy in accommodating . . . an arrangement of facilities that will ensure . . . efficient and economical use of existing real property resources [12:1].

The purpose of this research was to provide data which reflected the operational effectiveness of an organization's facility assignments by analyzing the frequency and distance interactions[1] between alternative activity locations among various existing facilities (2:27). This analysis was intended to show which of the functional activities were interrelated and to illustrate the relative magnitude of the existing interactions (7:58). The problem was to analyze the activity-facility assignments and to determine if they could have been varied to decrease the total distance involved in the interaction between the aircraft maintenance activities of the 4950th Test Wing located at Wright Patterson Air Force Base, Ohio (WPAFB).

DEFINITION OF TERMS

Activity -- an activity (work center)[2] performs a specific function within the maintenance organization. An organization may be comprised of one or more activities.

Facility -- a facility defines the physical structure which houses one or more activities.

Frequency of Interactions -- refers to only the physical interaction between activities rather than both the physical and the communicative (i.e., telephone, radio, etc.) interactions. These interactions may be objectively measured over a specified time period.

Total Distance -- the mathematical product of the frequency of interactions between activities and the actual distance between activities.

JUSTIFICATION

The current Air Force Installation Master Plan consists of a detailed description of existing and projected facilities utilization based on a five year programming cycle (13:1). The Installation Master Plan for each Air Base is continually updated, requiring considerable time and monetary outlay by the Major Command, the Installation, and the tenant organizations (2:4). After changes have been received and approved by the Facilities Utilization Board[3], the remainder of the evaluation (and corresponding recommendations to meet future mission requirements) is accomplished by civilian Architect/Engineer (AE) sources (2:11). Therefore, the requirements established on the organizational level have to be precise to preclude inaccurate facilities planning.

In the military environment, facilities planning became a topic of interest in the late 1960's (9). Determination of facilities usage in the Air Force has historically been predicated upon the experience of the facility managers (12). This method of determination, in addition to the necessity for yearly facility requirement updates, has resulted in the expenditure of considerable time in facilities planning with no objective means of evaluating the efficiency of the facility planning decision.

In an effort to improve the Air Force facilities planning system, an Air Force study was conducted in 1970 by Booz-Allen Applied Research, Incorporated, a civilian Architect/Engineer firm. The subject of the Booz-Allen study was a broad basewide facilities planning system. They were to investigate the feasibility of such a program, to propose the type of system to be used, and to provide an implementation plan (10:5-6).

In their conclusion, they stated that the results of this analysis could provide information relative to the efficient use of existing facilities and that it could represent "a savings of approximately 65% over the current Architect/Engineer method of updating base Master Plans [10:7]." This monetary savings, and an accompanying time savings of approximately 69%, could significantly improve the response capability of the Facilities Utilization Board, in addition to decreasing the need for outside Architect/Engineer contracts (10:7). Despite these projected

advantages and in spite of today's military environment of reduced budgets and increased mission requirements, there has been no evidence to indicate that further related research has been accomplished by the Air Force (9). Hence, there remained a need to investigate potential means of increasing the facility manager's capacity to objectively evaluate facility usage decisions without incurring excessive costs and expending excessive time (13).

DELIMITATION

The specific objective of this research was to provide the Deputy Chief of Maintenance of the 4950th Test Wing with a method of objectively evaluating the effectiveness of decisions concerning current and proposed facility usage.

Aircraft maintenance organizations are located at all Air Force bases with a flying mission. The 4950th Test Wing was selected for this research because its unique mission encompassed all aspects of aircraft maintenance. The mission included accomplishing authorized flight test programs on military systems, subsystems, and components (15:23-1). The maintenance complex was required to perform maintenance on assigned mission aircraft as well as on the base-level support aircraft.

Since the mission aircraft were used for testing many different systems and components, no two mission aircraft were identically equipped. Additionally, the

forty-three assigned aircraft encompassed both fixed-wing and rotary-wing aircraft including reciprocating, turbo-prop and jet aircraft types. All basic aircraft maintenance functions plus many advanced maintenance functions were performed on these aircraft.

Further, the 4950th Test Wing acquired numerous additional facilities when their mission was expanded in 1975. This expansion placed many of their facilities at a considerable distance apart since the runway separated the old and the newly acquired facilities.

The Deputy Chief of Maintenance, at the time of the expansion, was constrained to using only this set of facilities in accomplishing the mission. In addition, the minimum number of activities necessary to accomplish the mission was prescribed by regulation (ASDR 23-1).

OBJECTIVE

The objective of this thesis was to analyze the relationships between functional aircraft maintenance activities of the 4950th Test Wing and to determine if the activity locations could be varied to decrease the total distance involved in their interaction.

RESEARCH HYPOTHESIS

The location of functional aircraft maintenance activities at the 4950th Test Wing can be changed to decrease the total distance involved in their interaction.

CHAPTER 2

LITERATURE REVIEW

Few research efforts in organizational relationships and facility utilization have been documented by the Air Force. However, in civilian industry, many concepts and techniques for relating functional areas to each other have been studied and utilized to reduce costs related to overall facility-activity assignments (1:iii).

In the civilian environment, new industrial facilities and plans have been thoroughly analyzed prior to siting and construction. The basic relationships involved in these analyses were activity distance and frequency interactions (7:227). Planners were able to effectively determine efficient facility location assignments through the analysis of these relationships. The previous research devoted to the facilities assignment problem was dichotomized into those works which addressed general facility assignments and those that addressed the integration of new facilities with existing facilities.

General Facility Assignment

General facility assignment is the application of mathematical techniques to determine conceptually optimal facility location and activity assignments. One of the more

recent treatments of this subject was Brown and Gibson's (3) comprehensive discrete location model. The procedural application of the model was divided into three phases: (1) defining the information necessary to compare potential sites, (2) collecting information for each site, and (3) evaluating potential sites utilizing the location model.

Their work has been further supported by the Francis and Mallette (8) application of theoretical techniques for optimizing warehouse facility layouts[4]. Francis and Mallette considered the application of the generalized version of the transportation algorithm[5] as a means of determining a minimum cost solution to the layout problem. The model was defined on a grid-coordinate system and analyzed the distance and the frequency of interactions between a given point on the grid and variable storage locations.

Additionally, Zoller and Adendorff (20) addressed computer simulation in the analysis of feasible facility layouts. They hypothesized that the multitude of feasible facility layouts could be viewed as a finite statistical population. Several of the computer simulation programs that have been applied to this type of model were the Automated Layout Design Program (ALDEP), the Computerized Relationship Layout Planning Program (CORELAP), and the Computerized Relative Allocation of Facilities Technique Program (CRAFT). Francis and White, in analyzing these programs, described ALDEP and CORELAP as programs concerned

with the construction of a layout based on the closeness (importance) ratings[6], while CRAFT was concerned with the minimization of a linear function of the movements between departments (7:95-141). Zoller and Adendorff concluded that the most important characteristic of their model was its flexibility with regard to layout construction and evaluation.

New Facilities Integration

New facilities integration is the application of heuristics or optimization procedures to determine the location of proposed facilities in relation to existing facilities. One of the earlier treatments of this subject was that of Cooper (5) who postulated that the general warehouse destination problem could be described as follows: given a set of independent variables (i.e., destination location, destination requirements, and related shipping rates), it is possible to determine the allocation of new warehouses to include the number, location, and capacity. His model assumed that there were no restrictions on the location or the capacity of the new facility and that the shipping costs, per unit, were uniform. Assuming transportation costs were proportional to distance, he stated that it was desired to minimize the total distance between sources and destination. He proposed a heuristic approximation method for use when the number of variables (sources and destinations) became large.

Curry and Smith (6) proposed that the location-allocation problem be formulated as a non-linear discrete-location minimization problem which could be transformed into the recursive equations of dynamic programming[7]. They concluded that the utility of the dynamic programming approach to location-allocation problems was the ease with which a non-linear objective function and constraints could be handled.

Cabot, Francis, and Stary (4) considered the problem of locating new facilities with respect to the location of existing facilities so as to minimize the distances between new and existing facilities. They hypothesized that the location problem could be subdivided into two separate problems, each of which was equivalent to a specific linear programming problem. The first problem was that of minimizing the distances between the new and the existing facilities, while the second problem was that of maximizing the flow of materials between the new and existing facilities. They concluded that this analysis provided a means of obtaining an optimal solution to the location problem from the dual variables of the corresponding flow problem.

In support of this work, Pritsker and Ghare (12) formulated an algorithm for optimally locating new facilities with respect to existing facilities where movements between facilities are rectilinear[8]. Their algorithm has been programmed for the digital computer to accommodate

large problems. They hypothesized that their algorithm was the first special purpose model developed for efficiently solving a problem involving a large number of new facilities in discrete locations. Specifically, their model involved the rectilinear distance and frequency interactions between the new and existing facilities, and then minimized the total distance between these facilities. They concluded that their method was flexible and could be extended to accommodate the restrictions on the placement of new facilities and the number of new facilities allowed at a given location.

White (18), in contrast to the above and as a follow-on to that research, utilized Euclidean[9] distances in solving the optimal-facility location problem. He addressed the problem of locating multiple new facilities with respect to multiple existing facilities where there was an interchange of materials between the new facilities and between the new and existing ones. His notes defined the necessary and sufficient conditions for an optimum facility location, and then suggested the use of linear programming in obtaining a solution. In the same manner, the quadratic assignment model as formulated by Francis and White utilized binary and integer variables to optimally solve the assignment problem when there were interactions between multiple new activities in addition to interactions between the new and old activities (7:328-370). Since the quadratic assignment model is non-linear, the number of activities and facilities,

is greatly restricted. Utilizing the branch-and-bound technique[10] it becomes impossible to solve problems when the number of activities exceeds fifteen (7:336). Additionally, the quadratic assignment model is restricted to one activity per facility.

Pierce and Crowston (11) analyzed the branch-and-bound technique for solution of the quadratic assignment model by relating the procedures of several authors into a similar framework for comparison. They concluded that the procedures resulted in optimal solutions when carried to completion, but made no conclusions as to the relative efficiency of each procedure.

In larger quadratic assignment problems, several heuristic solution procedures have been utilized to obtain good (suboptimal) solutions. First, the steepest-descent pairwise-interchange solution procedure, easily adaptable to the computer, utilized the quadratic assignment model and interchanged those activities which provided the largest decrease in the objective function. This iterative process was continued until no further decreases could be obtained (7:338).

Another heuristic solution was the Vollman, Nugent, and Zartler procedure (19), similar to the steepest-descent pairwise-interchange solution procedure, but involving less computational time. The lesser computational time resulted from multiple interchanges during each iteration. Again,

these iterations were continued until no further decreases could be obtained (7:341).

Applications of facility planning systems have occurred in the civilian environment since the early 1960's. Civilian industry has used techniques similar to those indicated by Francis and Mallette (8) for efficient layout of warehouse floor space (9). City and urban planners have been involved in projects for planning optimum location of public and commercial services in support of housing developments in urban communities and small cities, predominently in the eastern United States (9).

In the military environment, the Booz-Allen research study (2) previously mentioned, related facilities allocation and planning to a specific Air Force environment. The objective of the first phase was to develop a facilities planning model for preparing base master plans to maximize mission effectiveness at minimum total cost. The second phase summarized the major achievements of the first phase and expanded them into a facilities planning system. They hypothesized that a model could be developed to maximize base-wide mission effectiveness for present and long-range mission requirements. For the given activity locations (facilities), the model determined the effectiveness of the layout based upon the distance between activity pairs and the importance of their being together. In this development, they not only used distance as a decision variable, but

also related the relative importance of one activity to another through dynamic programming.

SUMMARY

In summary, the literature review described the available techniques and concepts presently being used in facility assignment and planning and indicated that there was sufficient information in this area to allow investigation of the applicability of facilities assignment concepts to an existing Air Force organization.

CHAPTER III

METHODOLOGY

UNIVERSE AND POPULATION DESCRIPTION

The universe of interest in this study consisted of all United States Air Force maintenance organizations presently supporting flying missions. The population of interest was the aircraft maintenance complex of the 4950th Test Wing, Wright-Patterson AFB, Ohio, which was composed of discrete maintenance work centers. A census of this population was utilized to collect data over a two week period.

INFORMATION REQUIREMENTS

To provide data which reflected the operational effectiveness of an organization's facility assignments, the frequency and distance interactions between activities were analyzed (2:27). This analysis required the collection of information on the functional activities, the facilities which housed them, the distances between the facilities, and the frequency of interactions between activities.

DATA COLLECTION

Activities

Aeronautical Systems Division Regulation (ASDR) 23-1 provides a description of the activities necessary to perform the aircraft maintenance functions of the 4950th Test Wing (15). The aircraft maintenance complex consisted of eight major subdivisions, which were further separated into specific activities. Some of these activities consisted of several work centers (Appendix B). The physical space normally allocated to these activities was prescribed in Air Force Manual (AFM) 86-2, Chapter 8. The respective activity managers were consulted to ensure that these space requirements were adequate. The Real Property Projected Utilization List, PCN:N200174, provided a current listing of the space allocated to the activities listed in ASDR 23-1 (16). These regulations provided the information on the activities and related space requirements which comprised the set of activity requirements for the problem.

Facilities

The Real Property Projected Utilization Lists, PCN:N200174 and PCN:N200181, identified the facilities by building number currently being utilized by the 4950th aircraft maintenance organization as well as the overall floor space of each facility. These lists also enumerated all activities being performed within each facility (16; 17).

Floor plans (blueprints) for each facility indicated the distribution of the floor space allocated to each activity. These floor plans were used in conjunction with a building survey to determine the suitability of each facility for accommodating activities. The building survey form (Figure 1) was used to assess the floor layout, to evaluate the condition of the facility, and to provide information on critical dimensions, such as interior heights, door widths and heights, and structural protuberances. These physical characteristics were used to determine the capacity of a facility to house an activity. For example, facility A had 5000 square feet of floor space and a ten foot ceiling. Yet, it would not house the C-130 activity which required the same floor space, but needed a thirty foot ceiling. These physical characteristics provided the set of constraints on activity location.

Distance

Once the facilities were identified, the distances between them were determined. This was accomplished by measuring the distances directly from maps of Wright-Patterson AFB obtained from Base Civil Engineering. Actual, rather than rectilinear or Euclidean, distance was used since it accurately represented the true route traveled between facilities. For example, buildings A and B were one mile apart (Euclidean and rectilinear), separated by a runway. To proceed from A to B, the shortest authorized

Building Number	________	Area (sq ft)	____________
Description of Building	______________________ ______________________	Category Code	__________
Nominal Size	______________________		
Ceiling Height	_____________	Door Height (Acft)	______
Number of Floors	_____________	Door Width (Acft)	______
Type of Floor	_____________	Condition	______

Frame	Wood Frame Steel Masonry			
Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	#		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond	Yes	No	Central
	Standby Generator	Yes	No	Cap.___KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

Figure 1

Building Survey

route (actual) was around the runway, a distance of two miles. Since crossing the runway was prohibited, the Euclidean or rectilinear distances did not indicate the true distance traveled between facilities (13). Therefore, the actual distance between facilities constituted a set of parameters required for the analysis. This data was recorded (Appendix C) as shown in Figure 2.

Since there was extensive physical separation between facilities, the distance between activity locations became an important consideration in determining the activity-facility assignments (13). Therefore, since the activity locations were the only variable in this research, the distance between activities, a function of their location, became a crucial factor affecting total distance traveled.

Frequency of Interaction

The objective of interaction data collection was to indicate the actual number of physical interactions between activities over a period of time. Data on the actual number of job related personnel movements between activities was collected by the activity supervisors over a two week period. These movements were recorded on data collection forms (Figure 3) provided by the 4950th Test Wing. In anticipation of future requirements to provide a cost analysis of these interactions, the form also provided for collection of additional data to support such

FACILITY NUMBER	FACILITY NUMBER																			
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
01																				
02																				
03																				
04																				
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19																				
20																				

Figure 2

Distance Matrix

Work Center # _______ Building # _______

Date	Destination Work Center/Bldg	Mode of Transportation POV-GOV-Walk	Time Out	ETR	Pay Grades/ Number of People

Figure 3

Dispatch Recording Sheet

an analysis. For the purpose of this research it was assumed that this data collection period (two weeks) was representative of the organization's frequency of interactions during the period of time that the mission of the 4950th Test Wing remained the same. Therefore, the number of interactions between activities was assumed to remain constant, independent of activity location. This frequency of interactions data (Appendix D) provided the second set of parameters necessary for the subsequent analysis.

DATA MANIPULATION

Once the data was collected, it was placed in useable format. The distance and frequency (interaction) data was placed in matrix form (Appendices C and D, respectively) to facilitate mathematical manipulations. The activity and facility data provided the requirements and the constraints on the problem.

After the distance data was collected, it was recorded as shown in Figure 2. Each facility was assigned a number. This format leads to the application of subscripts to the distance data for use in the model. For example, the distance between facility 6 and 14 became $D_{6,14}$. In this manner the distance data could be referenced through the subscipted notation.

In a similar manner, the frequency of interactions between activities was indicated by the use of subscripts. For example, the frequency that activity 23 initiated

interactions with activity 4 became $F_{23,4}$. It should be noted that the frequency that activity 4 initiated interactions with activity 23 was not necessarily the same as the above. The sum of the two discrete frequencies represented the total number of interactions between the two activities.

Whether or not an activity could be located in a specific facility was determined on an individual basis from the data collected in the activity and facility surveys. This insured that an activity would only be located in a suitable facility.

MODEL DEVELOPMENT

No algorithm, exactly addressing the types of variables and constraints offered in this situation could be located in the current literature. Several authors, however, have used the quadratic assignment model in addressing the location of new facilities with respect to existing facilities (4; 5; 6; 11). This type of model was used as a basis for the solution of this activity-facility location problem. The model developed was similar since it compared fixed activities located in fixed facilities to the location of the remaining activities in the available facilities.

The quadratic assignment model as formulated by Francis and White (7) involved the analysis of discrete activity locations using the distance and the frequency of

interactions between the activities. Each activity interacted at a given frequency with other activities. An activity, when located in a specific facility, performed these interactions over the distances to each of the facilities containing the other activities. Their model when solved determines those locations of activities in fixed facilities that minimizes the total distance (7:185). This model, as shown in figure 4, was initially considered for the solution of the problem. It was determined from the data collected that the number of activities (thirty) was too large to be solved optimally on the computer. Therefore, a heuristic approach was utilized to find a good solution to the problem.

This approach, the steepest-descent pairwise-interchange method, repeatedly searches for the pair of activities that, when interchanged, results in the greatest decrease in the objective function (7:333). Since this method does not discriminate between those activities which are interchangeable and those which are not, a modification of this procedure had to be used. The modified procedure allowed for the selection of activities (or activity groups) to be exchanged in accordance with the following criteria: select that activity from the interchangeable activities with the largest number of interactions with another activity (or activity group). Relocate that activity in a suitable facility (including the interacting activity's facility, if feasible) nearest to the interacting activity

$$X_{k,j} = \begin{cases} 1 & \text{If activity i is located in facility j} \\ 0 & \text{Otherwise} \end{cases}$$

$D_{j,k}$ = Distance from facility j to facility k

$F_{i,l}$ = The number of interactions initiated by activity i to activity l

W_i = The weight (capacity) of activity i

K_j = The capacity of the facility j

Minimize $\sum_{i} \sum_{j} \sum_{k} \sum_{l} (F_{i,l} + F_{l,i}) D_{j,k} X_{l,j} X_{l,k}$

Constraints:

$\sum_{j} X_{i,j} = 1$ Each activity must be located in a facility

$\sum_{i} W_i X_{i,j} \leq K_j$ The sum of the activity sizes in facilities are less than or equal to the capacity of facility_j

Figure 4

Activity-Facility Model

(or activity group). Facility suitability was determined on an individual basis from the building surveys. This procedure was used repetitively until a good solution to the problem was obtained.

A computer program was written (Appendix E) which evaluated any set of assignments including the current assignment and allowed the user to evaluate the effect of interchanging activities by computing the percent increase or decrease in total distance associated with that change.

First, the program read the frequency matrix, the distance matrix and the current activity assignments. Second, the user could input the desired assignments to be evaluated. Third, the computer program evaluated the desired assignments by: (1) computing the total distance, (2) converting the total distance from feet to miles, and (3) computing the percent change in total distance. Fourth, the program then printed the desired assignment total distance (in both feet and miles), printed the percent change in the total distance over the current configuration, and indicated if the change resulted in an increase or a decrease in total distance. Last, the program allowed for the options of: (1) continuing to make more exchanges, and (3) stopping the program. In this manner, the user could manually interact with the computer to determine a good solution to the problem.

MODEL SOLUTION

Using the methods previously discussed, each of the activities were initially limited to their current location (facility). The program was then used to determine the total distance of this current configuration. This distance became the reference distance for use in determining any subsequent decrease in total distance. Feasible activity relocations were determined following the previously specified criteria and the resultant total distance was compared with the reference distance to determine the percent change.

MODEL VALIDATION

The model was validated by demonstrating consistency in predicting the total distance traveled for a given configuration of input parameters. The procedure incorporated the parameters of distance between facilities, number of activities, number of facilities, and the frequency of interactions between activities. Within these parameters, the model computed the total distance traveled to accomplish the aircraft maintenance mission within a given period of time.

In summary, the model accurately represented the actual situation with the following assumptions. It was assumed that there will be no new construction within the 4950th Test Wing, and that all aircraft maintenance

activities peculiar to its mission were performed within existing facilities. Therefore, the total number of facilities remained constant. Further, it was assumed that there were no plans to add or change access roads or side-walks between or around these facilities. Therefore, the actual distances between facilities remained constant and accurately represented the distance traveled between facilities.

Additionally, it was assumed that the activities represented the total number of activities required to accomplish the mission of the 4950th Test Wing aircraft maintenance complex. The model was designed with the assumption that the mission (number and type of aircraft supported) would not change, thereby making the number and type of activities required to support the mission constant.

The frequency of interactions between activities, as used in the model, was assumed to be constant and to be accurately represented by the data collected. Since the actual distance between facilities, the number and type of activities, the number and location of the facilities, and the frequency of interactions between activities were held constant, the problem became sensitive to one parameter - activity location.

CHAPTER IV

RESULTS

DATA COLLECTION

Data on the activities, the facilities, and the location of activities and facilities, including activity requirements, was collected during April and May of 1976. The results of this data collection follow.

Distance

Appendix F contains a map showing the portion of Wright-Patterson AFB containing the 4950th Test Wing Aircraft Maintenance complex and its facilities. Appendix G contains a list of the twenty-two facilities of interest and their corresponding building numbers. The actual distances between these facilities is contained in Appendix C.

Facilities

A survey of the existing twenty-two buildings occupied by the 4950th Test Wing Aircraft Maintenance complex was essential to collect and record information on the building condition and characteristics. Pertinent data about each building was identified and recorded on a building survey sheet. These results are contained in Appendix E.

Activities

The organization of the 4950th Test Wing Aircraft Maintenance complex is subdivided into 103 separate work centers. These work centers and their unique functions are listed in Appendix B. Those work centers which are collocated, or which normally function in close proximity with each other, were grouped and considered as one activity to facilitate manipulation of the model.

A list of these activities was formulated and is presented in Appendix I. The activities were numbered sequentially, and were subsequentially referred to as activity numbers in the model. The list contains thirty groups of functionally similar work centers.

Frequency of Interations

Each of the supervisors of the activities listed in Appendix F was asked to complete the Data Collection Form (Figure 3), soliciting the activity location and the number of interactions between their activity and the other activities within the maintenance complex. The interaction data was collected and is presented in Appendix D. As mentioned in Chapter III, the frequency of interactions initiated by activity X with activity Y (f_{xy}) may not be the same as the frequency of interactions iniated by activity Y with activity X (f_{yx}). Therefore, the total number of interactions between activities X and Y is the sum of f_{xy} and f_{yx}.

The interactions reflected in Appendix D were collected over the two week period from 18 April to 1 May 1976, and were assumed to be representative of any two week period throughout the year.

MODEL APPLICATION

The activity relocation candidates and the resultant proposed activity relocations were identified utilizing the criteria stated in Chapter III. Further, it was determined that the occurrence of more than thirty interactions between two individual activities accounted for seventy-one percent of all interactions. Since available time precluded the examination of all feasible activity-location combinations, only those activities which incurr more than thirty interactions with any other individual activity were considered.

Relocation Candidates

Twenty-seven activity pairs, each with more than thirty pair-wise interactions, were identified from the frequency of interaction matrix (Appendix D) as candidates for relocation. The relocation candidates incurred interactions which ranged from the selection minimum of thirty-one to a high of five hundred and fifty-five. These activity pairs are listed in Table 1.

TABLE 1

RELOCATION CANDIDATES

Activity (Appendix I)	Location (BLDG #)	Number of Interactions	Interacting Activity	Location (BLDG #)
29	4044/46	555	27	W.Ramp
20		498	26	E.Ramp
6	4042	342	27	W.Ramp
13	13	188	27	W.Ramp
11	145	139	12	148
21	4012	138	27	W.Ramp
10	106	132	28	4048
23	4012	123	27	W.Ramp
13	13	79	12	148
21	4012	77	26	E.Ramp
19	109	67	13	13
13	13	59	5	268
13	13	58	26	E.Ramp
10	106	56	13	13
10	106	52	26	E.Ramp
10	106	50	9	4028
13	13	48	11	145
10	106	45	7	4022
13	13	42	4	152
10	106	42	29	4044/46
13	13	40	3	4028
11	145	37	1	4012
6	4042	36	1	4012
10	106	35	11	145
25	884	35	1	4012
8	4026	32	27	W.Ramp
10	106	31	4	152

Branch Candidates

Additionally, it became apparent to the researchers that a decrease in total distance might occur if a branch was established on each side of the base for several activities which interacted with centralized locations on both the east and west sides of the base.

All activity interactions were again reviewed to determine those activities having a relatively equal number of interactions on either side of the runway. In this determination, the frequency of interaction matrix (Appendix D), the activity locations (Appendix I), and the maps of Wright-Patterson AFB (Appendix F) were consulted. This resulted in the identification of two activities as branch candidates. These activities are listed in Table 2.

TABLE 2

BRANCH CANDIDATES

Activity (Appendix I)	Location (Bldg #)	Interactions (West)	Interactions (East)
10	106	264	277
21	4012	175	173

<u>Relocation Feasibility</u>

The twenty-seven relocation candidates were examined to determine the feasibility of their relocation. Activity requirements and facility suitability (facility floor space, facility access, climate control, etc.) were compared using the criteria in Chapter III. From this comparison, eight feasible activity relocations were proposed as shown in Table 3.

TABLE 3

PROPOSED RELOCATIONS

Activity (Appendix I)	Location (Bldg #)	Proposed Activity Location (Bldg #)
29	4044/46	4022
2	4022	4012
20	106	145
12	148	268
5	268	148
21	4012	4042
23	4012	4042
10	106	4046
19	109	13
6	4042	4012
8	4026	4022
7	4022	4026

Branch Feasibility

Both branch candidates (activities) were examined to determine the feasibility of separating each of them into two individual branches. Activity requirements and facility suitability were compared and feasible branch relocations were proposed as shown in Table 4

TABLE 4

BRANCH RELOCATION

Activity (Appendix I)	Current Location	Proposed Branch Locations Branch 1	Branch 2
10	106	106	4046
21	4012	4012	93

INDIVIDUAL EVALUATIONS

Each proposed activity relocation or branch creation was evaluated individually and independently of the others by the computer program (Appendix E) discussed in Chapter III. The resultant total distance and percent change in total distance for each proposed activity relocation or branch creation are shown below in Table 5.

TABLE 5

INDIVIDUAL EVALUATIONS

Activity (Appendix I)	Proposed Location	Total Distance (Miles)	Percent Decrease (Percent)
Current Configuration		5090.64	-
29	4022		
2	4012	4872.22	4.3
10	4046	4872.32	4.3
6	4012	4963.02	2.5
20	145	4971.35	2.3
19	13	5070.01	0.4
8	4022	5085.60	0.1
7	4026		
5	148	5082.10	0.2
12	268		
21	4042	5274.35	-3.6 (Increase)
23	4042		
Branches			
21	4012/93	4679.29	8.1
10	4046/106	4503.44	11.5

CUMULATIVE EVALUATION

From the individual evaluations it was noted that the percent decrease in total distance ranged from 11.5 percent to -3.6 percent. The proposed changes were successively

evaluated by the computer program in descending order according to the individual decrease in total distance (Table 5). First, only the eight proposed activity relocations were evaluated to determine their combined effect on the total distance. Second, just the proposed branches were evaluated to determine their combined effect on the total distance. Finally, both groups were combined and then evaluated to determine the cumulative effect of all proposed changes on the total distance. The results of the evaluations are shown in Table 6.

TABLE 6

CUMULATIVE EVALUATION

Activity (Appendix I)	Total Distance Decrease Individual	Total Distance Decrease Cumulative	Percent Decrease Individual	Percent Decrease Total
Relocation Activities				
10	218.42	218.42	4.3	4.3
29,2	218.32	409.80	4.3	8.0
6	135.28	545.08	2.5	10.7
20	118.91	653.99	2.3	12.8
19	12.38	666.37	0.4	13.1
8,7	13.18	679.55	0.1	13.3
12,5	8.57	688.12	0.2	13.5
21,23	-175.11	513.01	-3.6	10.1
Branch Activities				
10	587.20	587.20	11.5	11.5
21	405.77	992.99	8.1	19.5
Relocation and Branch Activities Combined				
10	587.20	587.20	11.5	11.5
21	405.77	992.99	8.1	19.5
29,2	218.32	1211.29	4.3	23.8
6	135.28	1346.57	2.5	26.5
20	118.54	1465.11	2.3	28.8
19	12.38	1481.07	0.4	29.1
8,7	13.18	1494.25	0.1	29.4
12,5	8.57	1505.74	0.2	29.6
21,23	-175.11	1415.42	-3.6	27.8

The combined effects of the proposed changes provide a maximum decrease of 1505.74 one-way miles per two week period. Allowing for return trips, the yearly reduction in total distance would be 78,298 miles.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

An assessment of the potential value of this research has resulted in the following conclusions and recommendations.

Conclusions

It can be concluded, from the results of this research, that the location of the functional aircraft maintenance activities of the 4950th Test Wing can be changed to decrease the total distance involved in their interaction.

The following changes, as indicated by our model, will result in a 78,298 mile yearly decrease in distance traveled by the 4950th Test Wing aircraft maintenance personnel:

1. Place one sub-branch of the Non-Powered AGE Branch on each side of the runway in Building 106 and Building 4046.

2. Place one sub-branch of the Communication-Navigation Branch on each side of the runway in Building 4012 and Building 93.

3. Relocate the West Ramp Storage Area next to Hangar 4042 and relocate OMS Administration, Supervision, and Technical Administration to Building 4012.

4. Relocate the ABN Instrument Maintenance Shop to Building 4012.

5. Relocate the East Ramp Storage Area next to the North end of Building 145.

6. Exchange the Heavy Jet Dock in Building 4022 with the Structural Repair Dock in Building 4026.

7. Exchange the Propeller Dock in Building 268 with Base Flight Docks Five and Six in Building 148.

Recommendations

Based on the results of this research, it is reccommended that the changes proposed above be implemented if they are economically justifiable and are within the resource capability of the 4950th Test Wing.

Recommendations for Further Research

In providing timely evaluations of the effects of Air Force activity relocation with respect to facility availability and suitability, and to assess the impact of such changes on Operations and Maintenance Funds, the ability to rapidly generate cost information is essential. Automating the generation of cost information is a necessary step toward rapid evaluation of the impact of proposed changes. It is, therefore, recommended that the model developed in this research be expanded into an algorithm which incorporates cost factors and evaluates the full effect of activity location changes in terms of total cost.

APPENDIX A

EXPLANATORY FOOTNOTES

EXPLANATORY FOOTNOTES

1. Interactions -- the physical movement of personnel between activities. This does not include any other form of interaction (i.e., telephone, letter, etc.).

2. Work centers -- organizational elements to which maintenance personnel may be assigned or locations to which they may be dispatched.

3. Facility Utilization Board -- required by AFR 86-7, charged with conducting a comprehensive master planning program at both major command and installation levels.

4. Layout problem -- a problem that encompasses the allocation of floor space in a facility (i.e., a warehouse).

5. Transportation algorithm -- a mathematical procedure which is designed to minimize the distance traveled between locations.

6. Importance ratings -- these ratings ara a subjective evaluation of the necessity for one activity being located near another.

7. Dynamic programming -- a method used in determining solutions to certain non-linear optimization problems.

8. Rectilinear distance -- the right-angle distance between facilities.

9. Euclidean distance -- the straight line distance between facilities.

10. Branch and bound technique -- the recursive partitioning and fathoming (the lower bound of the partitioned set exceeds the upper bound of the current set) of the solution set to obtain the optimal solution without complete enumeration of all solutions.

APPENDIX B

WORK CENTER CODES

Work Center	Function	Mnemonic
U1000	Deputy Commander for Maintenance	DCMS
U1010	Production Analysis	ANAL
U1020	Training Management	LGMT
U1040	Plans, Programs, and Mobility	LGMX
U1100	Quality Control	QUAL
U1200	Maintenance Control	MCON
U1210	Job Control	JOBC
U1220	Plans and Scheduling	PLAN
U1221	Documentation	DOCR
U1230	Materiel Control	MATC
U1231	Production Control	PROD
U2000	Organizational Maintenance Squadron	OMSQ
U2010	Maintenance Supervision	OMSM
U2015	Tech Administration	OMSA
U2100	Heavy Jet Aircraft Administration	HJSU
U2110	Flight Line Maintenance, Flt "1"	HJF1
U2120	Flight Line Maintenance, Flt "2"	HJF2
U2130	Flight Line Maintenance, Flt "3"	HJF3
U2150	Propeller Aircraft Supervision	PROP
U2160	Flight Line Maintenance, Flt "A"	PFLA
U2170	Flight Line Maintenance, Flt "B"	PFLB
U2180	Flight Line Maintenance, Flt "C"	PFLC
U2191	Flight Mechanics Team "1"	MEC1
U2192	Flight Mechanics Team "2"	MEC2
U2194	ABN Instrument Maintenance/Opns Shop	AIOM
U2200	Heavy Jet Inspection	HJIN
U2210	Heavy Jet Dock "1"	HJK1
U2220	Heavy Jet Dock "2"	HJK2
U2230	Heavy Jet Dock "3" (Corrosion)	HJD3
U2250	Propeller Aircraft Inspection	PAIN
U2260	Propeller Aircraft Dock "3"	PAD3
U2270	Propeller Aircraft Dock "4"	PAD4
U2300	Support Equipment Branch	SUPT
U2310	Non-Powered AGE	NAGE

Work Centers	Function	Mnemonic
U2320	780 Equipment	780E
U2500	Base Flight/Transient Supervision	TRAN
U2510	Base Flight, Flt "A"	BFLA
U2511	Base Flight, Flt "B"	BFLB
U2512	Base Flight, Flt "C"	BFLC
U2513	Base Flight Dock "5"	BFD5
U2514	Base Flight Dock "6"	BFD6
U2520	Transient Flight, Flt "1"	TRF1
U2521	Transient Flight, Flt "2"	TRF2
U2522	Transient Flight, Flt "3"	TRF3
U3000	Field Maintenance Squadron	FMSQ
U3010	Maintenance Supervision	FMSM
U3015	Tech Administration	FMSA
U3100	Fabrication Branch	FABS
U3110	Machine	MACH
U3130	Structural Repair	STRU
U3140	Corrosion	CORR
U3150	Survival Equipment	SURV
U3151	Rubber Products	RUBB
U3152	Parachute	PARA
U3170	Non-Destructive Inspection	NDIN
U3200	Propulsion Branch	ENGS
U3210	Reciprocating Engine	RECP
U3220	Propeller Shop	PRPS
U3230	Jet Engine Shop	JETS
U3231	Engine Dispatch Section	ENGD
U3237	Test Cell	CELL
U3300	Aerospace Systems Branch	AERO
U3310	Repair and Reclamation	REPR
U3315	Wheel and Tire	TIRE
U3320	Fuel Systems	FUEL
U3330	Electric	ELEC
U3340	Pneudralics	PNEU
U3390	Egress	ORDS
U3360	Environmental	ENVR

Work Center	Function	Mnemonic
U3400	AGE Branch	AGEB
U3410	Repair - Inspection	AGER
U3420	Service - Pickup - Delivery (Area C)	AGES
U3421	Night Service -Pickup - Del (Area C)	AGNC
U3425	Service - Pickup - Delivery (West Ramp)	AGDW
U3426	Night Service - Pickup -Del (West Ramp)	AGDN
U4000	Avionics Maintenance Squadron	AMSQ
U4010	Maintenance Supervision	AMSM
U4015	Tech Administration	AMSA
U4100	Communication - Navigation Branch	CONV
U4110	Communication Shop	RADO
U4111	High Frequency Radio - ARIA	RADA
U4120	Navigation Shop	NAVS
U4140	Inertial Navigation Shop	INNS
U4200	Auto Flight Contr - Instrument Branch	AFCI
U4210	Auto Flight Controls	AFSC
U4220	Instrument	INST
U4300	Mission Systems Branch	MISS
U4301	Radio Frequency Shop	RADF
U4302	Antenna Shop	ANTE
U4303	Recorder/Timing Shop	RETI
U4304	Spacecraft Communications Shop	SCOM
U4500	Precision Measuring Equip. Lab	PMEL
U4510	Control Scheduling	PMEB
U4520	Quality Assurance	PMEQ
U4530	PMEL Annex	PMEA
U45AA	Electrical	PME1
U45BB	Oscilloscope	PME2
U45CC	Generator	PME3
U45DD	Electro - Mechanical	PME4
U45AS	Auto Calibration Consoles	PME5
U45BS	Auto Calibration Consoles	PME6
U45CS	Auto Calibration Consoles	PME7
U4900	T-40 Flight Trainer	TRNP

APPENDIX C

DISTANCE MATRIX

FACILITY

	1	2	3	4	5	6	7	8
1:	0	450	4000	650	900	1150	1400	1650
2:	450	0	1550	900	1150	1400	1650	1900
3:	4000	1550	0	4300	4400	4150	4900	4650
4:	650	900	4300	0	250	500	750	1000
5:	900	1150	4400	250	0	250	500	750
6:	1150	1400	4150	500	250	0	750	500
7:	1400	1650	4900	750	500	750	0	250
8:	1650	1900	4650	1000	750	500	250	0
9:	2750	3000	1600	2100	1850	1700	1850	1600
10:	16100	16350	14950	15450	15200	15050	15200	14950
11:	16950	17200	15800	16250	16000	15900	16000	15750
12:	18150	18400	16900	17500	17150	17000	17150	16900
13:	18500	18750	17250	17850	17500	17350	17500	17250
14:	19150	19400	17900	18500	18150	18000	18150	17900
15:	18420	18670	17170	17770	17420	17270	17420	17170
16:	18750	19000	17500	18100	17750	17600	17750	17500
17:	19050	19300	17800	18400	18050	17900	18050	17800
18:	19500	19750	18250	18850	18500	18350	18500	18250
19:	20400	20650	19150	19750	19400	19250	19400	19150
20:	20050	20300	18800	19400	19050	18900	19050	19800
21:	3000	3250	4850	2250	2550	2600	1280	1450
22:	18400	18650	17250	17750	17500	17350	17500	17250

(Distances are in feet)

FACILITY

	9	10	11	12	13	14	15	16
1:	2750	16100	16950	18150	18500	19150	18420	18750
2:	3000	16350	17200	18400	17750	19400	18670	19000
3:	1600	14950	15800	16900	17250	17900	17170	17500
4:	2100	15450	16250	17500	17850	18500	17770	18100
5:	1850	15200	16000	17150	17500	18150	17420	17750
6:	1700	15050	15900	17000	17350	18000	17270	17600
7:	1850	15200	16000	17150	17500	18150	17420	17750
8:	1600	14950	15750	16900	17250	17900	17170	17500
9:	0	13350	14150	15300	15650	16300	15570	15900
10:	13350	0	1700	2850	3200	3850	3120	3250
11:	14150	1700	0	1300	1650	2100	2100	1850
12:	15300	2850	1300	0	500	500	1850	1700
13:	15680	3200	1650	500	0	250	1700	2350
14:	16300	3850	2100	500	250	0	2250	2250
15:	15570	3120	2100	1850	1700	2250	0	400
16:	15900	3450	1850	1700	2350	2250	400	0
17:	16200	3750	2400	2250	2900	2800	520	560
18:	16750	4300	2900	1750	3400	3300	1150	1050
19:	17650	5200	4250	4050	4550	3600	2200	2000
20:	17300	4850	3200	2650	2250	2300	2300	2250
21:	1350	16800	17100	18250	18600	19250	18500	18850
22:	15800	2400	1700	1600	1700	1900	500	950

(Distances are in feet)

FACILITY

	17	18	19	20	21	22
1:	19050	19500	20400	20050	3000	18400
2:	19300	19750	20650	20300	3250	18650
3:	17800	18250	19150	18800	4850	17250
4:	18400	18850	19750	19400	2250	17750
5:	18050	18500	19400	19050	2250	17500
6:	17900	18350	19250	18900	2600	17350
7:	18050	18500	19400	19050	1280	17500
8:	17800	18250	19150	19800	1450	17250
9:	16200	16750	17650	17300	1350	15800
10:	3750	4300	5200	4850	16800	2400
11:	2400	2900	4250	3200	17100	1700
12:	2250	2750	4050	2650	18250	1600
13:	2900	3400	4550	2250	18600	1700
14:	2800	3300	3600	2300	19250	1900
15:	520	1150	2200	2300	18500	500
16:	560	1050	2000	2250	18850	950
17:	0	500	1750	2650	19150	1050
18:	500	0	1350	2300	19700	1600
19:	1750	1300	0	2250	20600	2550
20:	2650	2300	2250	0	20250	2550
21:	19150	19700	20600	20250	0	18600
22:	1050	1600	2550	2550	18600	0

(Distances are in feet)

*

APPENDIX D

FREQUENCY OF INTERACTION MATRIX

A C T I V I T Y

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1:	0	1	1	1	4	0	0	6	0	0	1	0	11	0	0
2:	1	0	4	1	0	0	0	1	2	0	0	0	1	0	0
3:	16	0	1	0	0	0	0	1	4	0	0	0	13	3	1
4:	14	19	0	0	5	0	0	0	0	5	0	0	9	2	0
5:	21	0	0	14	0	0	0	0	2	4	2	3	16	0	0
6:	36	15	0	0	0	0	0	0	0	0	2	0	0	1	0
7:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:	0	0	4	6	7	0	4	5	4	0	2	4	0	0	0
9:	0	0	3	1	1	0	4	5	2	0	3	7	0	0	0
10:	14	0	3	31	13	0	45	0	50	0	35	3	56	0	0
11:	37	16	0	0	0	0	1	0	0	0	0	139	20	0	0
12:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:	28	0	40	42	59	0	18	44	18	2	48	79	1	2	0
14:	0	0	2	0	0	0	3	0	0	0	6	0	0	0	0
15:	0	5	2	6	2	0	0	0	0	0	0	0	0	0	0
16:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:	0	0	0	0	9	0	0	0	0	0	0	18	16	0	0
19:	6	0	0	0	3	0	0	0	1	13	0	0	67	0	3
20:	0	0	0	0	3	0	0	0	0	10	7	0	9	0	2
21:	0	0	10	1	28	2	18	1	1	0	21	12	10	0	3
22:	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:	0	0	0	0	0	0	0	0	0	0	7	0	2	0	0
24:	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25:	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29:	0	0	3	0	0	0	10	9	2	0	0	0	0	11	0
30:	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(Interactions)

ACTIVITY

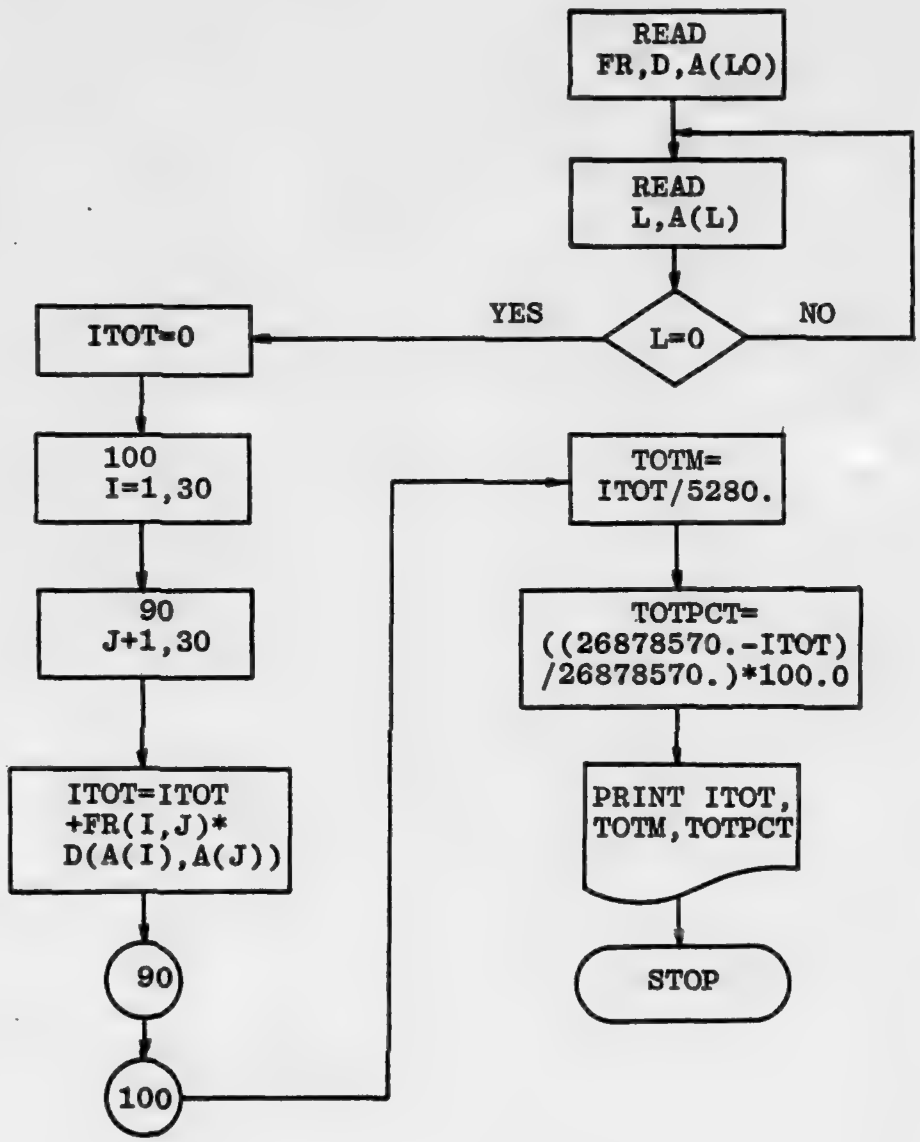
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1:	0	0	0	0	0	0	0	0	0	0	1	11	0	0	0
2:	0	0	0	0	0	0	0	0	0	0	2	7	0	0	0
3:	0	0	0	0	0	1	0	0	1	0	0	7	0	0	0
4:	0	0	0	0	1	0	0	0	1	2	0	0	0	0	0
5:	0	0	0	0	0	0	0	0	0	0	1	8	0	0	0
6:	0	0	0	0	0	0	0	0	0	0	0	342	0	0	0
7:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:	0	0	0	0	0	0	0	0	0	0	1	32	0	0	0
9:	0	0	0	0	0	0	0	0	0	0	2	7	0	0	0
10:	1	0	0	0	9	5	0	2	7	0	52	6	132	42	0
11:	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
12:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:	5	0	0	25	2	14	0	0	0	0	58	188	0	1	0
14:	0	0	0	0	0	0	0	0	0	0	20	25	0	0	0
15:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:	3	0	0	2	0	0	0	0	0	0	17	0	0	0	0
19:	0	0	0	0	0	0	0	0	0	1	0	0	0	9	0
20:	0	0	0	0	0	0	0	0	0	8	498	0	0	14	0
21:	0	0	0	0	0	0	1	0	1	0	77	138	0	0	0
22:	0	0	0	0	0	2	0	0	0	5	0	0	0	0	0
23:	3	0	0	0	0	0	0	0	0	0	19	123	0	0	0
24:	0	0	0	0	0	0	0	0	0	3	0	21	0	0	0
25:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28:	0	0	0	0	0	0	0	0	0	4	0	0	0	6	0
29:	0	0	0	32	0	0	0	0	0	0	0	555	15	0	0
30:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(Interactions)

*

APPENDIX E

COMPUTER PROGRAM



LEGEND

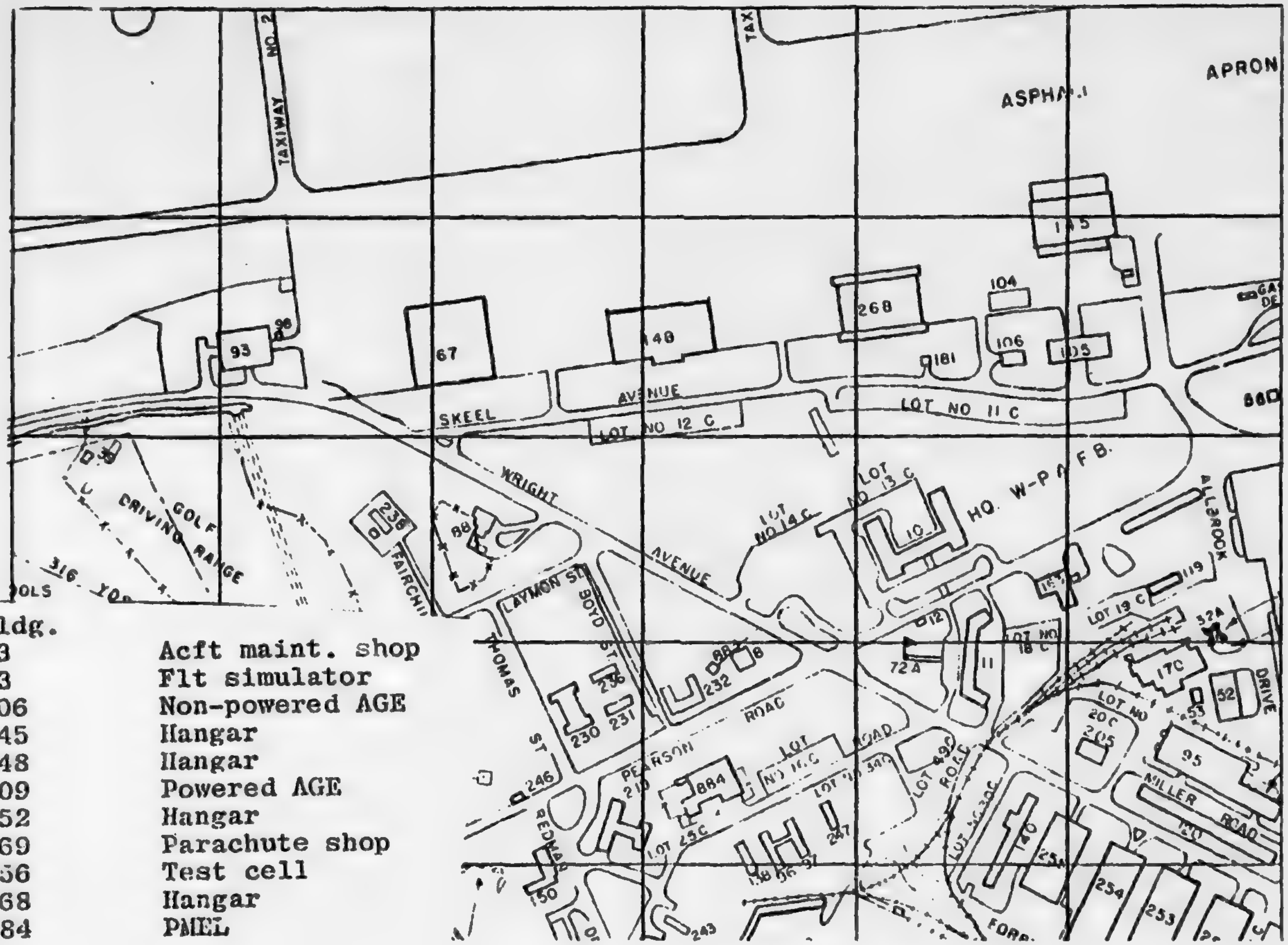
FR - Frequency matrix
D - Distance matrix
A(LO) - Initial location data
TOTPCT - Percent reduction in distance
TOTM - Total distance in miles
ITOT - Total distance in feet

```
INTEGER A(30),FR(30,30),D(22,22)
DO 10 N=1,30
C READ FREQUENCY OF INTERACTIONS
READ(10,5)K,(FR(N,J),J=1,30)
005 FORMAT (V)
010 CONTINUE
DO 20 M=1,22
C READ DISTANCES BETWEEN EXISTING FACILITIES
READ(11,5)(D(M,K),K=1,22)
020 CONTINUE
C READ VECTOR SHOWING CURRENT ACTIVITY LOCATIONS
021 A(1)=9;A(2)=8;A(3)=7;A(4)=10;A(5)=17;A(6)=1;A(7)=8;A(8)=5
A(9)=6;A(10)=16;A(11)=15;A(12)=18;A(13)=13;A(14)=4;A(15)=14
A(16)=12;A(17)=13;A(18)=15;A(19)=11;A(20)=11;A(21)=9;A(22)=1
A(23)=9;A(24)=1;A(25)=20;A(26)=22;A(27)=21;A(28)=3;A(29)=2
A(30)=19
025 PRINT,"ENTER CHANGES TO THE ASSIGNMENT ARRAY AS FOLLOWS:"
PRINT,"ACTIVITY NUMBER, ACTIVITY BUILDING ASSIGNMENT"
PRINT,"ENTER 0,0 IF NO CHANGES ARE TO BE MADE"
030 READ, L, A(L)
IF(L.EQ.0)GO TO 050
GO TO 030
050 ITOT=0
DO 100 I=1,30
DO 090 J=1,30
ITOT=ITOT+FR(I,J)*D(A(I),A(J))
090 CONTINUE
100 CONTINUE
TOTM=ITOT/5280.0
TOTPCT=((26878570.0-ITOT)/26878570.0)*100.0
PRINT 120,ITOT
PRINT 121, TOTM
PRINT 122, TOTPCT
IF(TOTPCT.LT.0) PRINT,"YOUR CHANGE HAS RESULTED IN A NET
&INCREASE"
IF(TOTPCT.GT.0) PRINT,"YOUR CHANGE HAS RESULTED IN A NET
&DECREASE"
PRINT,"DO YOU WISH THE CURRENT ASSIGNMENTS? YES=1, NO=2"
READ,N
IF(N.EQ.2)GOTO 119
PRINT,"THE CURRENT ACTIVITY ASSIGNMENTS ARE :"
DO 129 N=1,30
PRINT 124,N,A(N)
129 CONTINUE
119 PRINT,""
120 FORMAT(1X,"TOTAL DISTANCE IS - ",I20," FEET",//)
121 FORMAT(1X,"OR  ",F10.2," MILES",//)

ready

*
```

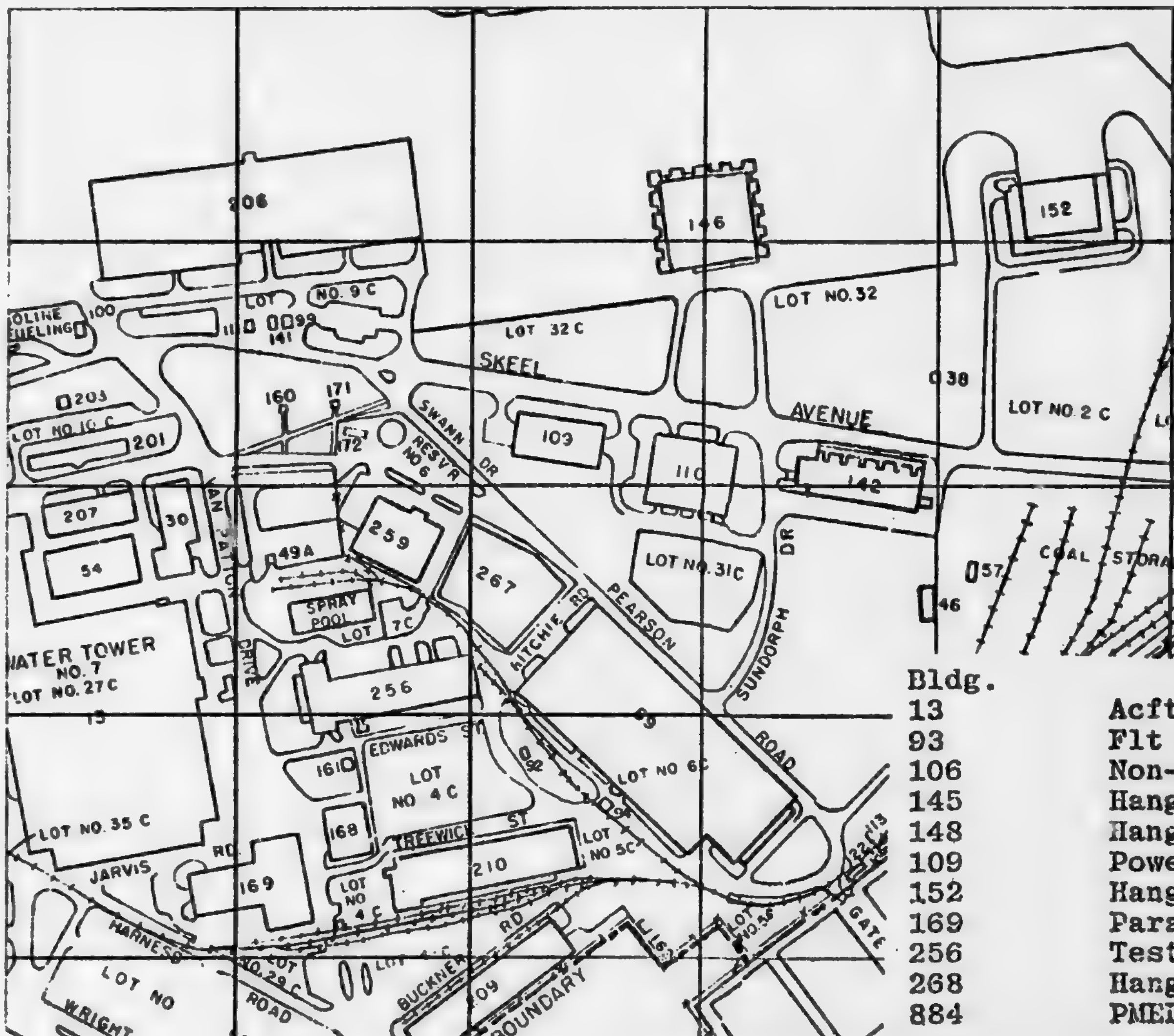
```
480 122 FORMAT(1X,"THE PERCENT CHANGE IN DISTANCE OF THIS",/,"
490&CONFIGURATION IS  ",F10.4," PERCENT.",//)
500 124 FORMAT(1X,"ACTIVITY ",I2," IS IN BUILDING ",I2,/)
510 PRINT,"TYPE 1 TO GO BACK TO THE ORIGINAL ASSIGNMENT"
520 PRINT,"2 TO CONTINUE WITH THE SAME ASSIGNMENTS MADE SO FAR"
530 PRINT,"OR 3 TO STOP THE PROGRAM."
540 READ, M
550 GOTO (21,25,130),M
560 130 STOP;END

ready

*
```

APPENDIX F

MAPS OF WRIGHT-PATTERSON AFB

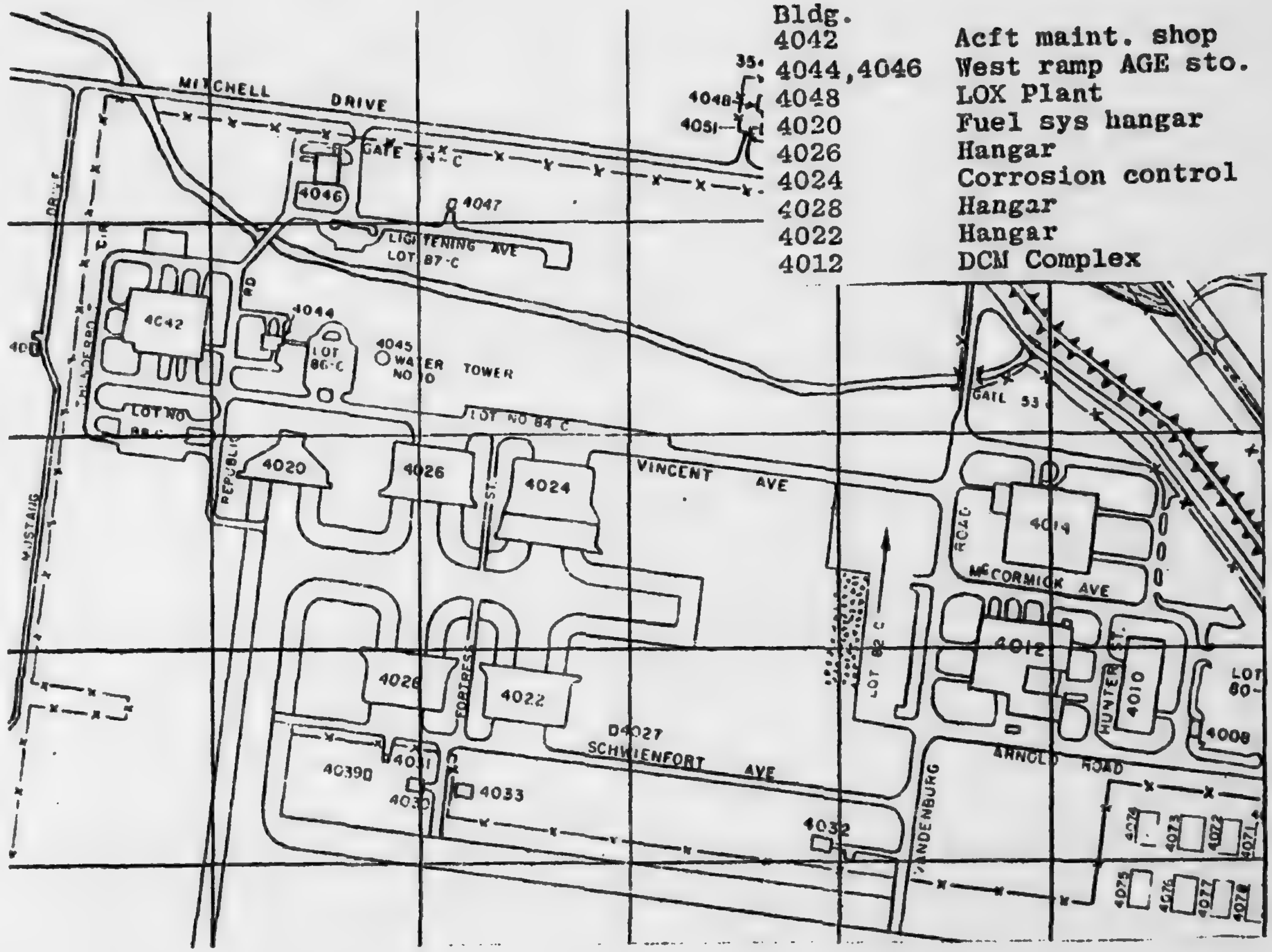


Bldg.	
13	Acft maint. shop
93	Flt simulator
106	Non-powered AGE
145	Hangar
148	Hangar
109	Powered AGE
152	Hangar
169	Parachute shop
256	Test cell
268	Hangar
884	PMEL



Bldg.	
13	Acft maint. shop
93	Flt simulator
106	Non-powered AGE
145	Hangar
148	Hangar
109	Powered AGE
152	Hangar
169	Parachute shop
256	Test cell
268	Hangar
884	PMEL

Bldg.	
4042	Acft maint. shop
4044,4046	West ramp AGE sto.
4048	LOX Plant
4020	Fuel sys hangar
4026	Hangar
4024	Corrosion control
4028	Hangar
4022	Hangar
4012	DCM Complex



APPENDIX G

FACILITIES

FACILITY	BUILDING NUMBER	DESCRIPTION
1	4042	Aircraft maintenance shop
2	4044,4046	West ramp age storage
3	4048	LOX Plant
4	4020	Fuel systems hangar
5	4026	Hangar
6	4024	Corrosion control
7	4028	Hangar
8	4022	Hangar
9	4012	DCM Complex
10	152	Hangar
11	109	Powered AGE
12	256	Test cell
13	13	Aircraft maintenance shop
14	169	Parachute Shop
15	145	Hangar
16	106	Non-Powered AGE
17	268	Hangar
18	148	Hangar
19	93	Flight simulator
20	884	PMEL
21		West ramp
22		East ramp

*

APPENDIX H

BUILDING SURVEYS

BUILDING SURVEY

Building Number 4042 Area (sq ft) 32,300

Description of Building Aircraft Maint. Shop Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame: Wood Frame / Steel / Masonry

Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 2		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central *
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

* OFFICE SPACE ONLY

BUILDING SURVEY

Building Number 4044/46 Area (sq ft) 6093

Description of Building: WEST RAMP AGE STORAGE

Category Code: ________

Nominal Size: ________

Ceiling Height: ________ Door Height (Acft): ________

Number of Floors: 1 Door Width (Acft): ________

Type of Floor: Concrete Condition: Good

Frame	Wood Frame Steel Masonry

TWO BAYS

Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap._____KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 4048 Area (sq ft) 4040

Description of Building LOX PlANT Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame: Wood Frame / Steel / Masonry

Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap._____KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 4020 Area (sq ft) 16,000

Description of Building Fuel Systems HANGAR Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor CONCRETE Condition GOOD

Frame: Wood Frame / Steel / Masonry

Interior Partitions	Load Bearing	Yes	No	LIMITED office space!
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	#2		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 4026 Area (sq ft) 28,000

Description of Building HANGAR Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

with tail door

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame: Wood Frame / Steel / Masonry

Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 4024 Area (sq ft) 41,794

Description of Building CORROSION Control Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor CONCRETE Condition GOOD

Frame: Wood Frame / Steel / Masonry

Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 4028 Area (sq ft) 28,000

Description of Building HANGAR Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______ WITH TAIL DOOR

Number of Floors 1 Door Width (Acft) ______

Type of Floor CONCRETE Condition Good

Frame	Wood Frame Steel Masonry			
Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ______ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 4022 Area (sq ft) 28,000

Description of Building HANGAR Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______ WITH TAIL DOOR

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame: Wood Frame / Steel / Masonry

Interior Partitions	Load Bearing	Yes No
	Non Load Bearing	Yes No
	Frame, Wood	s.f.
	Masonry	s.f.
	Special	s.f.
	Recoverable	Yes No
Utilities	Toilets	# 1
	Water	Hot Cold
	Heating	Yes No Central
	Air Cond.	Yes No Central
	Standby Generator	Yes No Cap. ____ KVA
	Fire Protection	Dry Wet Deluge
Site Facilities	Hard Surface	
	Parking	
	Loading Bay	
	Taxi-way Access	Yes No

BUILDING SURVEY

Building Number 4012 Area (sq ft) 53,141

Description of Building DCM Complex Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame: Wood Frame / Steel / Masonry

Interior Partitions	Load Bearing	Yes	No	PRIMARILY office space	
	Non Load Bearing	Yes	No		
	Frame, Wood	s.f.			
	Masonry	s.f.			
	Special	s.f.			
	Recoverable	Yes → SOME	No		
Utilities	Toilets	# 2			
	Water	Hot	Cold		
	Heating	Yes	No	Central	
	Air Cond.	Yes	No	Central	
	Standby Generator	Yes	No	Cap. ____	KVA
	Fire Protection	Dry	Wet	Deluge	
Site Facilities	Hard Surface N/A				
	Parking				
	Loading Bay				
	Taxi-way Access	Yes	No		

BUILDING SURVEY

Building Number 152 Area (sq ft) 35,371

Description of Building HANGAR Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor CONCRETE Condition GOOD

Frame: Wood Frame / Steel / Masonry

Interior Partitions	Load Bearing	Yes	No	LIMITED ONE STORY OFFICE SPACE
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes → SOME	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 109 Area (sq ft) 20,283

Description of Building Powered Age Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame	Wood Frame Steel Masonry	
Interior Partitions	Load Bearing	Yes No
	Non Load Bearing	Yes No
	Frame, Wood	s.f.
	Masonry	s.f.
	Special	s.f.
	Recoverable	Yes No
Utilities	Toilets	2
	Water	Hot Cold
	Heating	Yes No Central
	Air Cond.	Yes No Central
	Standby Generator	Yes No Cap. ____ KVA
	Fire Protection	Dry Wet Deluge
Site Facilities	Hard Surface Parking Loading Bay	
	Taxi-way Access	Yes No

BUILDING SURVEY

Building Number 256 Area (sq ft) 72,679

Description of Building TEST CELL Category Code

Nominal Size

Ceiling Height Door Height (Acft)

Number of Floors 1 Door Width (Acft)

Type of Floor CONCRETE Condition GOOD

Frame	Wood Frame Steel Masonry			
Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 2		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface Parking Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 13 Area (sq ft) 282,026

Description of Building Acft Maint. Shop Category Code

Nominal Size

Ceiling Height Door Height (Acft)

Number of Floors 1 Door Width (Acft)

Type of Floor Concrete Condition Good

Frame	Wood Frame Steel Masonry			
Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 6		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 169   Area (sq ft) 37,502

Description of Building PARAchute shop   Category Code ______

Nominal Size ______

Ceiling Height ______   Door Height (Acft) ______

Number of Floors 1   Door Width (Acft) ______

Type of Floor Concrete   Condition Good

Frame	Wood Frame Steel Masonry			
Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ______ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 145 Area (sq ft) 35,536

Description of Building HANGAR Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame	Wood Frame Steel Masonry			
Interior Partitions	Load Bearing	Yes	No	N/A
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 3		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central *
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

* OFFICE ONLY (VERY NOISY)

BUILDING SURVEY

Building Number 106 Area (sq ft) 2,400

Description of Building: Non Powered Age Category Code ______

Nominal Size: ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame	Wood Frame Steel Masonry		
Interior Partitions	Load Bearing Non Load Bearing Frame, Wood Masonry Special Recoverable	Yes Yes s.f. s.f. s.f. Yes	No HAS RAIL IN No Center of Ceiling Limited Office SPACE No
Utilities	Toilets Water Heating Air Cond. Standby Generator Fire Protection	# 2 Hot Yes Yes ~~Yes~~ Dry	 Cold No Central * No Central No Cap.____KVA Wet Deluge
Site Facilities	Hard Surface Parking Loading Bay Taxi-way Access	 Yes	 No

* OFFICE ONLY

BUILDING SURVEY

Building Number 268   Area (sq ft) 41,138

Description of Building: HANGAR   Category Code ______

Nominal Size ______

Ceiling Height ______   Door Height (Acft) ______

Number of Floors: 2-ON OUTSIDE OF HANGAR   Door Width (Acft) ______

Type of Floor: CONCRETE   Condition: GOOD

Frame: Wood Frame / Steel / Masonry

Interior Partitions	Load Bearing	Yes	No	OFFICE SPACE ON BOTH SIDES OF HANGAR
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 148 Area (sq ft) 32,608

Description of Building HANGAR Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame	Wood Frame Steel Masonry			
Interior Partitions	Load Bearing	Yes	No	Limited Office space
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 93 Area (sq ft) 12,501

Description of Building Flight Simulator Category Code ______

Nominal Size ______

Ceiling Height ≈20' Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor Tile over Concrete Condition Good

Frame	Wood Frame Steel Masonry	

Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 2		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

BUILDING SURVEY

Building Number 884 Area (sq ft) 15,039

Description of Building PMEL Category Code ______

Nominal Size ______

Ceiling Height ______ Door Height (Acft) ______

Number of Floors 1 Door Width (Acft) ______

Type of Floor Concrete Condition Good

Frame	Wood Frame Steel Masonry			
Interior Partitions	Load Bearing	Yes	No	
	Non Load Bearing	Yes	No	
	Frame, Wood	s.f.		
	Masonry	s.f.		
	Special	s.f.		
	Recoverable	Yes	No	
Utilities	Toilets	# 1		
	Water	Hot	Cold	
	Heating	Yes	No	Central
	Air Cond.	Yes	No	Central
	Standby Generator	Yes	No	Cap. ____ KVA
	Fire Protection	Dry	Wet	Deluge
Site Facilities	Hard Surface			
	Parking			
	Loading Bay			
	Taxi-way Access	Yes	No	

APPENDIX I

ACTIVITIES

ACTIVITY	WORK CENTER	FUNCTION
1	U1000	Deputy Commander for Maintenance
	U1010	Production Analysis
	U1020	Training management
	U1040	Plans,Programs and Mobility
	U1100	Quality Control
	U1200	Maintenance Control
	U1210	Job Control
	U1220	Plans and Scheduling
	U1221	Documentation
	U1230	Material Control
	U1231	Production Control
2	U2000	Organizational Maint. Squadron
	U2010	Maintenance supervision
	U2015	Technical administration
3	U2100	Hvy Jet Acft Supervision
	U2110	Flt line maint. flt one
	U2120	Flt line maint. flt two
	U2130	Flt line maint. flt three
	U2200	Hvy jet inspection
4	U2150	Propeller Acft Supervision
	U2180	Flt line maint. flt-C,C-130
5	U2170	Flt line maint. flt-B
	U2192	Flight mechanics team 2
	U2260	Propeller acft dock three
6	U2194	Abn inst maint/ops shop
7	U2210	Heavy jet dock one
8	U2220	Heavy jet dock two
9	U2230	Heavy jet corrosion dock three
	U3140	Corrosion control
10	U2310	Non-powered AGE
	U2320	780 equipment
11	U2500	Base Flt/Transient Supv
	U2510	Base flight,flt A
	U2511	Base flight,flt B
	U2520	Transient flight one
	U2521	Transient flight two

AD-A032 539 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHO--ETC F/G 15/5
ANALYSIS OF AIRCRAFT MAINTENANCE FACILITY ASSIGNMENTS AT WRIGHT--ETC(U)
SEP 76 T M GRIFFITH, H A STEWART

UNCLASSIFIED SLSR-17-76B NL

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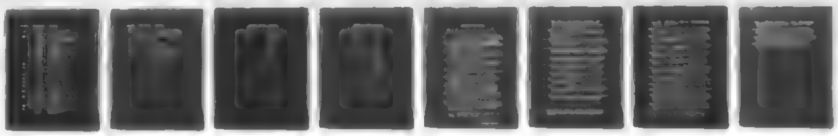

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ACTIVITY	WORK CENTER	FUNCTION
12	U2513	Base flt, dock five
	U2514	Base flt, dock six
13	U3000	Field Maintenance Squadron
	U3010	Maintenance Supervision
	U3015	Technical Administration
	U3110	Machine shop
	U3130	Structural repair
	U3170	NDI
	U3210	Reciprocating engines
	U3220	Propeller shop
	U3230	Jet engine shop
	U3300	Aerospace Systems Branch
	U3315	Wheel and tire
	U3330	Electric shop
	U3340	Pneudraulics
	U3360	Environmental
14	U3320	Fuel cell
15	U3150	Survival equipment
	U3151	Rubber products
	U3152	Parachute
16	U3237	Test cell
17	U3310	Repair and reclamation
18	U3390	EGRESS
19	U3400	AGE Branch
	U3410	Repair-inspection
20	U3420	AGE Service-pickup-delivery East ramp
21	U4100	Comm-Nav Branch
	U4110	Communication shop
	U4120	Navigation shop
	U4140	Inertial Nav. shop
22	U4111	H F Radio ARIA
23	U4200	Auto Flt Center-Inst Branch
	U4210	Auto flt control
	U4220	Instrument

ACTIVITY	WORK CENTER	FUNCTION
24	U4300	Mission Systems Branch
	U4301	Radio frequency shop
	U4302	Antenna shop
	U4303	Recorder/timing shop
25	U4500	PMEL
26	-----	East ramp
27	-----	West ramp
28	-----	Liquid Oxygen Storage
29	U3425	AGE service-pickup-delivery West ramp
30	U4900	T40 Flight trainer

*

CURRENT ACTIVITY LOCATIONS

ACTIVITY (NUMBER)	LOCATION (BLDG #)
1	4012
2	4022
3	4028
4	152
5	268
6	4042
7	4028
8	4026
9	4024
10	106
11	145
12	148
13	13
14	4020
15	169

CURRENT ACTIVITY LOCATIONS

ACTIVITY (NUMBER)	LOCATION (BLDG #)
16	256
17	13
18	145
19	109
20	109
21	4012
22	4042
23	4012
24	4042
25	884
26	EAST RAMP
27	WEST RAMP
28	4048
29	4044,4046
30	94

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